

Woodlands Meed College

Flood Risk Assessment

West Sussex County Council

October 2019



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Executive Summary

West Sussex County Council are currently investigating the feasibility of building a new school building for Woodlands Meed College. This will involve demolition of the current site and re-development of the land.

The proposed development is located within Flood Zone 1, however the site is larger than 1 hectare in size and hence a Flood Risk Assessment (FRA) is required to support the necessary planning application in line with current national planning policy.

This FRA has been written at the feasibility stage of development, and outlines flood risk on the site, constraints on the development and recommendations for mitigation of flood risk. A detailed FRA will be required to support the planning application. A summary of flood risk is provided in the table below.

This FRA concludes that at this feasibility stage, the proposed development would be at medium risk of flooding from surface water and low/no risk of flooding from all other sources. It also concludes that the development, incorporating appropriate mitigation will not cause an increased flood risk elsewhere and could reduce the medium risk from surface water to low risk.

Table 0-1 - Summary of flood risk

Flood risk	Baseline risk	Post development risk	Commentary
Fluvial	Low	Low	The development site is in Flood Zone 1 and therefore has a less than 0.01% (1 in 1000) AP risk of fluvial flooding.
Tidal	None	None	The development site is not in an area of tidal flood risk.
Surface Water	Medium to Low	Low	There are existing surface water flow paths through the northern extent of the site. However, this area will become a car park once developed and therefore mitigation will reduce the existing risk.
Groundwater	Low	Low	The development site is not in an area of groundwater vulnerability.
Sewer	Unknown (Low)	Unknown (Low)	At this stage there is limited information known about foul flooding in the area. Southern Water will need to be consulted at the next assessment stage.
Other sources	None	None	There are no other known sources of flooding to the site.

1. Introduction

1.1. Assessment purpose

Atkins Limited was commissioned by West Sussex County Council (WSCC) to complete a Flood Risk Assessment (FRA) to support ongoing design work at Woodlands Meed College. This document describes the proposed works, the flood risks at the site and the potential implications of this development in terms of flood risk. This document also identifies relevant planning policies (both national and local) and concludes with recommendations for the design work to ensure that planning policy requirements are met and that a detailed FRA is undertaken at a later stage which is suitable for planning submission.

1.2. Scope of work

In line with the National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2019), this FRA is required to:

- Define flood risk to the site;
- Outline (if required) the proposed mitigation measures; and
- Provide evidence demonstrating that the development is at an acceptable risk of flooding, whilst ensuring the development will not increase flood risk elsewhere.

1.3. Source of data

To inform this FRA, the following available information has been utilised:

- Environment Agency (EA) Flood Zones, surface water mapping and statutory main river mapping were taken from the Defra Data Service Platform¹;
- Design drawings shown in Appendix A and B (E03707 SK 01 and E03707 A SK 03) (HCC, 2018);
- West Sussex County Council Local Flood Risk Management Strategy (West Sussex County Council, 2014);
- Mid Sussex District Council Strategic Flood Risk Assessment (SFRA) (Mid Sussex District Council, 2015);
- West Sussex Preliminary Flood Risk Assessment (West Sussex County Council, 2011);
- The River Adur Catchment Flood Management Plan (Environment Agency, 2009); and
- South East England Lead Local Flood Authorities guide for master planning sustainable drainage into developments (AECOM).

¹ <https://environment.data.gov.uk/>, accessed on 28/08/2019

2. Site location and development proposal

Woodlands Meed College (Birchwood Grove Road, Burgess Hill, West Sussex, RH15 0DP) is in the town of Burgess Hill in the district of Mid Sussex and in the County of West Sussex, as illustrated in Figure 2-1.

The proposed development is an enhancement to the current college site. The current site layout is shown in Appendix A, and the new proposed development in Appendix B. The plans involve demolition of the current site and re-development of the land. The main alteration is that currently there are multiple buildings in the northern part of the site (Area A on Figure 2-1), however the redevelopment is to create one large building on the current playing fields to the south of the site (Area B on Figure 2-1). The current building area will then become a car park, with green spaces on the perimeter of the site. The part of the site next to Birchwood Grove Road will be sold so the site area will decrease.

As it is an existing site, the land use type is expected to stay similar, with both impermeable and permeable surfaces. However, it is noted that the southern playing fields are steeply sloping and therefore will involve substantial cut and fill.

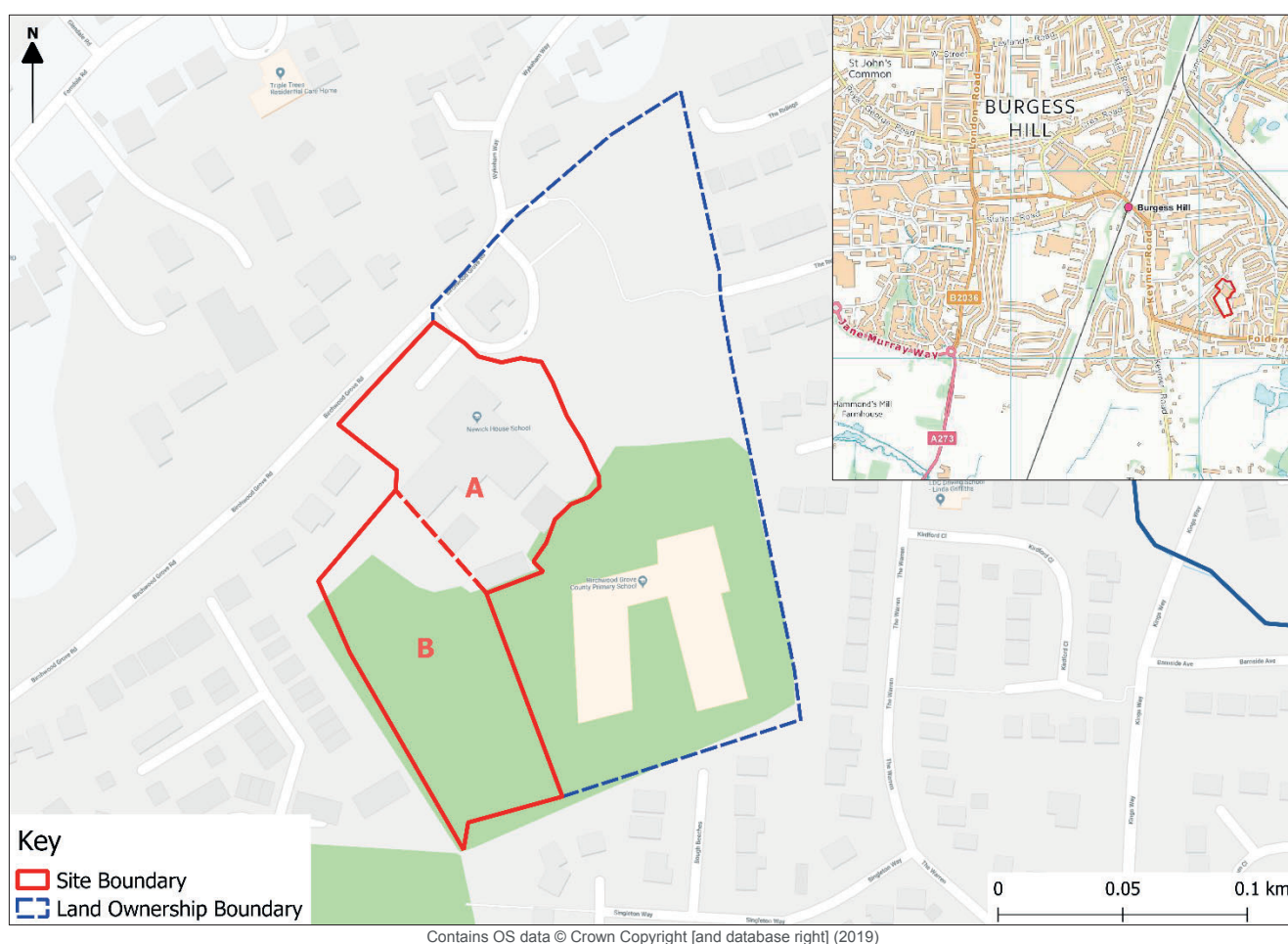


Figure 2-1 - Location Plan and indicative site boundary

3. Planning policy

3.1. Background

3.1.1. National Planning Policy

The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2019) is the overarching document in relation to development and flood risk and sets out the Government's policy on development relating to flood risk. The aim of the NPPF is to ensure that development is not at an unacceptable risk of flooding. Where development is unavoidable in areas at risk from flooding, the NPPF ensures that the development is safe without increasing flood risk elsewhere and where possible reducing flood risk overall.

In accordance with the NPPF, a site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

The proposed development is located within Flood Zone 1; however, the proposed development site is greater than 1 hectare.

The NPPF classifies land use based on vulnerability to flood risk and according to it, the site is classified as 'More Vulnerable' land use. 'More Vulnerable' infrastructure is considered appropriate for development in Flood Zone 1, without the need for an Exception Test.

3.1.2. Local Planning Policy

The Mid Sussex District Plan 2014-2031 (Mid Sussex District Council, 2018) is the latest version of the districts local planning policy, informed by the Mid Sussex SFRA (Mid Sussex District Council, 2015) and the South East Guide for Master Planning of SuDS document (AECOM).

The District Plan 2014-2031 sets out a policy (SP41) to ensure that developments do not increase flood risk now or under a changing future climate. It identifies that "all new developments of 10 dwellings or more, or equivalent non-residential or mixed development unless demonstrated to be inappropriate" should include Drainage Systems (SuDS). This will reduce the risk the development increasing flood risk. SuDS should also improve biodiversity, the landscape and public amenity in the area.

The District Plan 2014-2031 outlines the preferred hierarchy in SuDS solutions which are as follows:

1. Infiltration
2. Attenuation and discharging to watercourse
3. Discharge to surface water sewers

3.2. Flood Zone definition

The NPPF outlines four Flood Zone classifications of which three have been utilised by the Environment Agency in the creation of their Flood Map. These Flood Zones are used in determining the appropriateness of proposed development uses when considering flood risk through the application of the Sequential Test. They represent flooding without flood defences in place.

The Flood Zones are defined as:

- Flood Zone 1 – Areas with a 'Low Probability' of flooding and where the annual probability of flooding is lower than 1 in 1000 (0.1%) for either fluvial or tidal flooding. The NPPF imposes no constraints upon the type of development within Flood Zone 1.
- Flood Zone 2 – Areas with a 'Medium Probability' of flooding and where the annual probability of flooding is between 1 in 1000 (0.1%) and 1 in 100 (1%) for fluvial flooding or between 1 in 1000 (0.1%) and 1 in 200 (0.5%) for tidal flooding. The NPPF recommends that Flood Zone 2 is suitable for most types of development with the exception of 'Highly Vulnerable' land uses.
- Flood Zone 3 – Areas with a 'High Probability' of flooding and where the annual probability of flooding is 1 in 100 (1%) or greater for fluvial flooding or 1 in 200 (0.5%) or greater for tidal flooding. The NPPF recommends that appropriate development is based upon a further classification of Flood Zone 3 into 3a

'High Probability' and 3b 'Functional Floodplain' (where water has to flow or be stored in times of flood during the 1 in 20, 5%, event).

3.3. Sequential Test

The purpose of the Sequential Test is to promote development within areas at lowest flood risk. Therefore, area for development in Flood Zone 1 should be sought in the first instance. As the proposed development is within Flood Zone 1, and is an upgrade to an existing site, the proposed work could not be located elsewhere, i.e. the development has to occur at this location, or not at all. Therefore, it is considered that the Sequential Test is not applicable for this scheme.

4. Baseline flood risk

4.1. Overview

As outlined within the NPPF, flood risk from all sources must be addressed within the FRA to ensure that potential flood risk has been considered during the development design and proposed works. Therefore, this section outlines all the potential sources of flood risk to the site, a quantification of the risk and the implications these risks have on the development. It is also necessary to outline any records of previous flooding events as these may identify areas vulnerable to flooding.

4.2. Historical flood events

In West Sussex there is a history of flooding from fluvial, coastal, surface water and groundwater sources. However, for Burgess Hill the Environment Agency (EA) does not have any record of any historical events. The River Adur Catchment Flood Management Plan outlines that there is low risk from river flooding in Burgess Hill, but there is a risk of surface water flooding, drainage issues and localised flooding from local streams (Environment Agency, 2009).

4.3. Fluvial flood risk

Fluvial flooding occurs when there is an exceedance of the flow capacity of river channels, leading to overtopping of the river banks and inundation of the surrounding land. The development site is located around 250m from the closest fluvial water source. This is a small stream, which is a tributary to the River Adur and classified as an EA main river (Figure 4-1). Due to the small size of this watercourse, it does not provide a high risk of flooding to the adjacent land. Therefore, the site is in Flood Zone 1, and has less than a 0.01% (1 in 1000) AP risk of fluvial flooding (Figure 4-2). It is expected that under future climate change this site will still not be at risk from fluvial flooding, however this cannot be confirmed without undertaking modelling of the area which is not appropriate for the scale of the development. Due to this identified low risk of fluvial flooding no further analysis is required.



Figure 4-1 - Environment Agency Main River Map

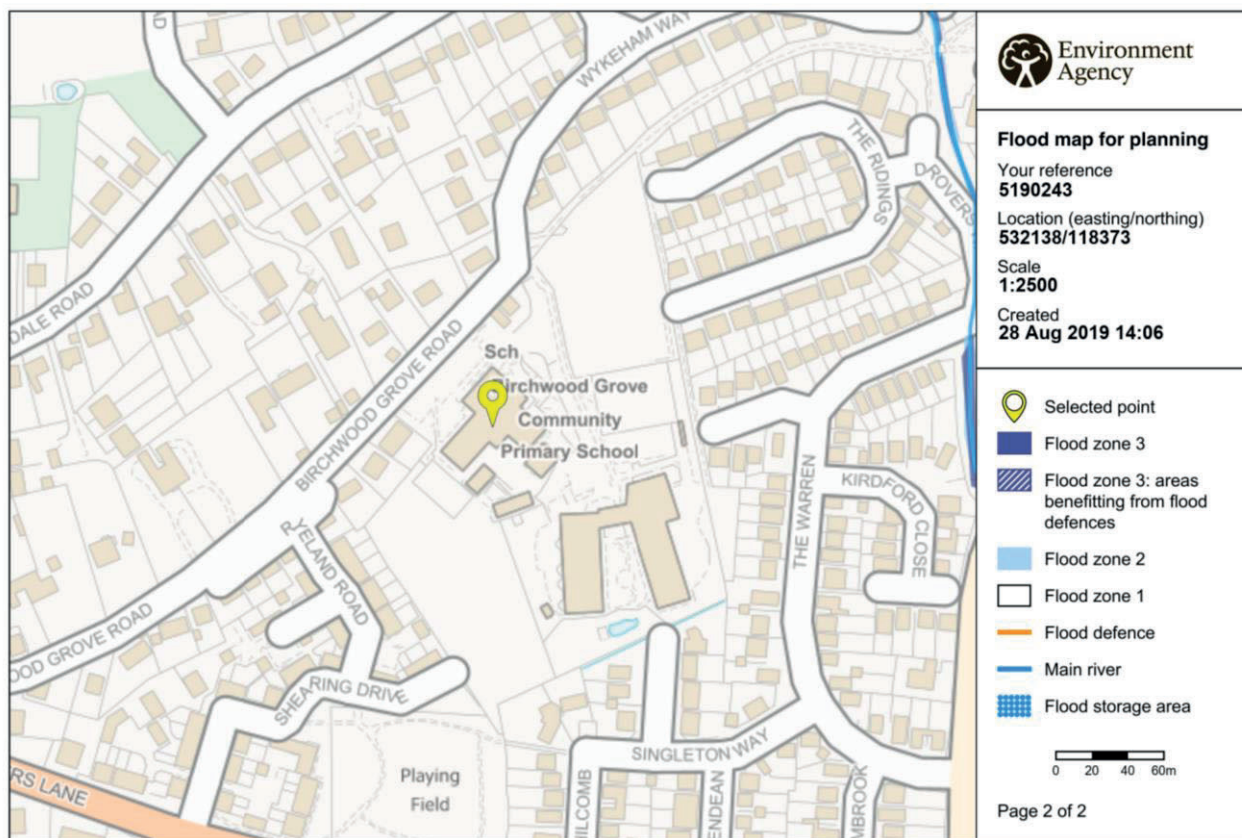


Figure 4-2 – Environment Agency Flood Zones Map

4.4. Tidal flood risk

Tidal flood risk occurs as a result of high tide levels and / or wave action. Alternatively, propagation of high tides and storm surges up tidal river channels, leading to overtopping of the river banks and inundation of the surrounding land. Although there are streams within Burgess Hill, these are very small tributaries to the River Adur, which has a tidal limit of Shermanbury, which is located approximately 10km west (downstream) of Burgess Hill. There is therefore no risk of tidal flooding and no further analysis is required.

4.5. Surface water flood risk

Surface water flooding occurs when rainfall intensities exceed the infiltration capacity such that water collects on the ground surface. Therefore, there is a greater risk of flooding from this source within urbanised areas where there is a higher proportion of impermeable surface.

The Local Flood Risk Management Strategy identifies that within Burgess Hill there are 2,500 properties at risk of flooding by surface water (West Sussex County Council, 2014). As shown in Figure 4-3, on the development site there is a surface water flow path that flows from the west, through the northern extent of the site, and drains into the EA main river ditches to the east of the site. This causes areas of High Risk to the north west of the existing building, and Low Risk on other sides of the existing building. The site is summarised to have Low to Medium Risk.

The East Sussex Preliminary Flood Risk Assessment (West Sussex County Council, 2011) identifies that Burgess Hill will be at risk of at least 0.3m of flooding during a 0.5% (1 in 200) AP flood event, and therefore a 'substantial' future flood risk. This will be from a mix of flood risks including Fluvial and Surface Water.

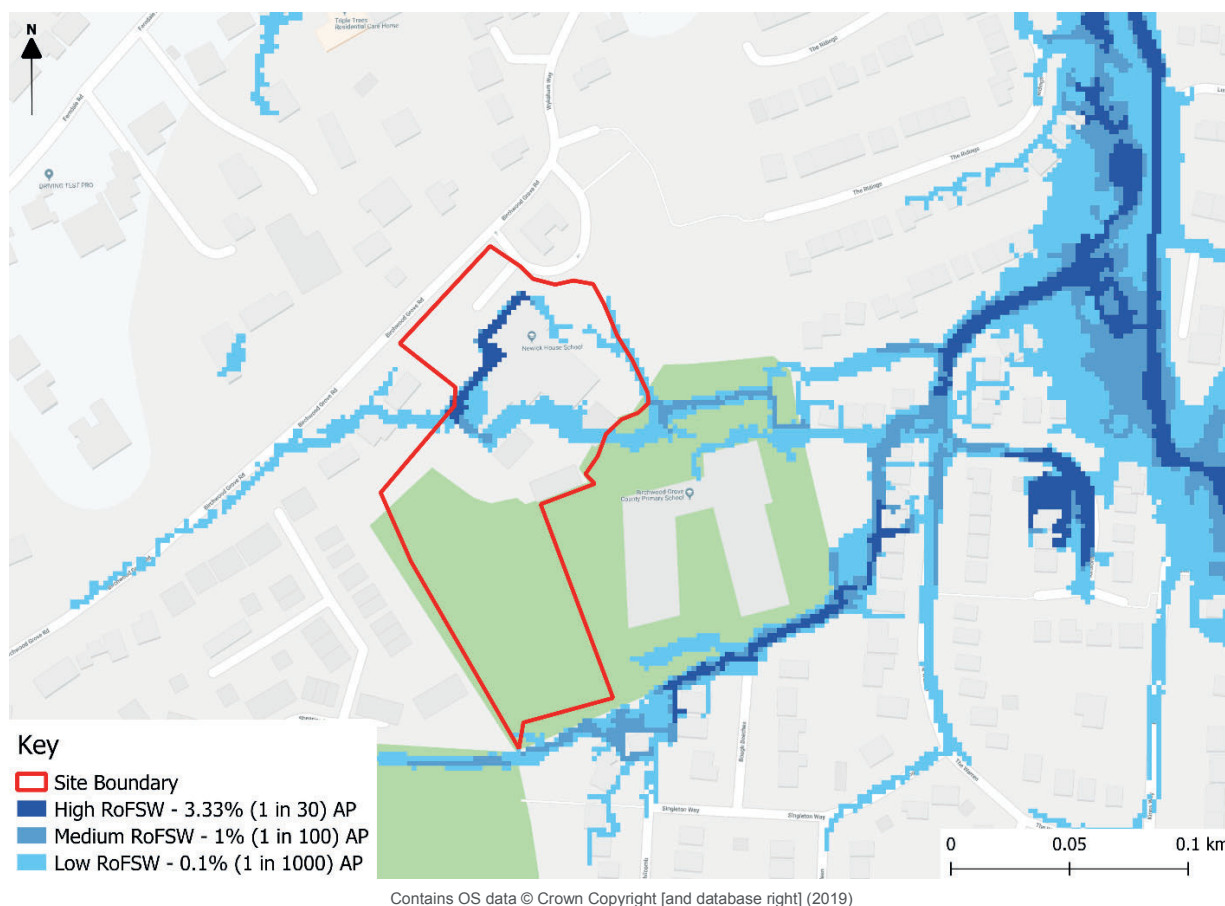


Figure 4-3 - Environment Agency Risk of Flooding from Surface Water (RoFSW) Map

4.6. Groundwater flood risk

Groundwater flooding normally occurs where the water table meets the ground surface in low lying areas which are underlain by permeable rock known as an aquifer. Groundwater flooding tends to follow long periods of sustained rainfall but can also be caused by local obstructions to groundwater flow (e.g. following the placement of engineering structures or buildings with foundations) or by the rebound of groundwater levels after a decrease in abstraction or dewatering.

The underlying geology of the site is Weald Clay Formation, mostly mudstone with some sandstone to the North East of the site (British Geological Survey, 2019) which means that there is impeded drainage in the area. The soil type is Soilscape 18 which consists of slowly permeable seasonally wet slightly acidic by base rich loamy and clayey soils (LandIS, 2019). There are Secondary A aquifers (permeable layers capable of supporting water supplies at a local scale) in the layers of sandstone bedrock on the site. However, the Woodlands Mead College development area is not in a groundwater vulnerability area (Defra, 2019) and therefore, the risk of groundwater flooding is considered low and no further analysis is required.

4.7. Sewer flooding

Flooding from sewers is caused by a blockage, failure or generally an under-capacity system. West Sussex County Council have identified that Burgess Hill has previously experienced regular sewer flooding (West Sussex County Council, 2014). Documents from West Sussex County Council and Mid Sussex District Council (for example the Strategic Flood Risk Assessment, the Local Flood Risk Management Strategy and the Preliminary Flood Risk Assessment) have been reviewed in order to further understand the risk of sewer flooding on the site. However, little detail is provided other than Southern Water operate in this area. Southern Water will therefore need to be contacted at the next stage for historic records of surface water flooding (DG5) and consulted as to whether the current systems have the capacity to accept any increase in foul flows created by the development, without increasing flood risk.

4.8. Other sources of flood risk

There are no other known sources of flooding to the site.

5. Scheme impacts on flood risk

5.1. Surface water flood risk

As identified in Section 4 and Figure 4-3, there is varying (mostly low) risk of surface water flooding on the site. This is ponding around the current building as shown in Figure 4-3. When the new development is built, under current proposals (Appendix B) the building is in an alternative position on the site, out of the main flow path. Therefore, it is expected that flood risk will decrease. It is proposed that a car park will be in this location. As outlined in Section 3.1.2, SuDS opportunities should be identified in order to reduce the overall flood risk to the site. However, it should be noted that the area is underlain by Weald Clay and therefore it may not be viable to use infiltration systems, the highest in the District Plans outlined hierarchy, and attenuation systems may have to be designed. It is recommended that soakage tests are undertaken to ascertain the viability of any infiltration techniques. The SFRA (Mid Sussex District Council, 2015) identifies that due to the geology, developments within Burgess Hill will need to carefully design surface water drainage to ensure that they are still effective and promote some infiltration while focusing on attenuation systems.

Surface water drainage systems will need to be designed in line with the Lead Local Flood Authorities of the South East of England guide for master planning sustainable drainage into developments (AECOM).

Other than the movement of buildings around the site, the land use type is expected to stay similar, with both impermeable and permeable surfaces. However, it is noted that the southern playing fields are steeply sloping and therefore will involve substantial cut and fill. This will have to be calculated to predict if it will alter surface water flow paths and run-off rates.

5.2. Sewer flooding

In order to identify the foul flood risk to the site, Southern Water will need to be consulted. As part of the development it is expected that the College will expand by 36 students, and therefore there is likely to be a small increase in foul flow from the site. However, this will not be a substantial increase and therefore the risk is unlikely to be altered as a result of the development.

6. Conclusions and recommendations

The conclusions and recommendations that have been made from this FRA are:

- As the proposed development is in Flood Zone 1 and is a re-development of an existing site, there is no other suitable location for the proposed development. It is therefore recommended that the Sequential Test does not apply to this development.
- The site is classed as 'More Vulnerable' infrastructure, which is considered appropriate for development in Flood Zone 1, without the need for an Exception Test.
- The site is located within an area of low to medium risk of surface water flooding. This is due to ponding of a surface water flow route around the existing building. The location of this building is proposed to move and therefore this will alleviate some of the flood risk. A drainage strategy should incorporate SuDS.
- Southern Water will need to be consulted as to historic records of surface water flooding (DG5) and whether the current systems have the capacity to accept any increase in foul flows created by the development, without increasing flood risk.
- The disposal method and design of surface water run-off should be in line with the SuDS hierarchy and South East Lead Local Flood Authorities SuDS design guidance (AECOM) and it is recommended that at an early stage soakage tests are undertaken to ascertain the viability of any infiltration techniques.
- Flood risk is low from fluvial and groundwater sources. There are no other known sources of flood risk (e.g. tidal or from reservoirs or canals) to the site or that would be impacted by the development.

In summary it is concluded that the proposed development is at medium risk of flooding from surface water and low/no risk of flooding from all other sources. It also concludes that with appropriate mitigation, the development will not cause an increased flood risk elsewhere and could reduce the medium risk from surface water to low risk.

7. References

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Appendices



Appendix A. Existing site plan

Woodlands Mead College College Site

Feasibility Options

Existing Site Plan

Key:

1. Car Park
2. Minibus drop off
3. Games Court (tarmac)
4. Hard Play (tarmac)
5. Soft Play Area (grass)
6. Habitat Area
7. Playing Field
8. Synthetic turf

- Existing Pedestrian Access
- Existing Vehicular Access
- Site Boundary
- North

1:1250 @ A3

E03707.SK.01

June 2018



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Appendix B. Proposed site plan

Site Viability Options
**Proposed Site Plan
 Option 1A**

PROS AND CONS	via fire path
Access to build	●
Abnormals	●
Intensity of Use	●
Transport	●
Planning	●
Utilities	●
Impact on existing	●
Section 77	●
Aspect / orientation	●
Revenue	●
Overall Cost	●

Key:

- ▲ Existing Pedestrian Access
- ▲ Existing Vehicular Access
- Site Boundary
- Land Ownership Boundary
- Potential Land Sale
- Land Swap
- New Build
- New Build Sports Hall

North
 1:1000 @ A3
E03707.SK.03
 June 2018



- Key:**
1. Car Park
 2. Minibus drop off
 3. Games Court (tarmac)
 4. Hard Play (tarmac)
 5. Soft Play Area (grass)
 6. Habitat Area
 7. Playing Field
 8. Synthetic turf

GENERAL NOTES

This option does not involve any land swaps and uses the playing field to the rear of the college site. This land is steeply sloping in both directions and will involve substantial cut and fill although some of this could be reused to extend the level of the existing college car park in order to release a more viable area for land disposal. Construction will be disruptive to Birchwood Primary as only viable access will be via fire path to field, deep within school site. No geotechnical information was available for this site but initial indications show presence of silty clay and boggy patches indicating the need for a piled foundation solution.

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